

a value of an attractive force that would be expected to be exerted between the first and second surfaces as a result of the Casimir force if the first surface was the nominal flat surface.

23.(New) The apparatus of claim 22 wherein the nominal force value is calculated using the relation:

$$F = \frac{A\pi^2\bar{h}c}{240d^4}$$

24 where F is the nominal force value, A is the area of the smaller of the first and second surfaces, \bar{h} is Planck's constant, c is the speed of light, and d is the separation distance.

24.(New) The apparatus of claim 18 wherein the first surface is a substantially spherical surface and the second surface is a substantially flat surface.

25.(New) The apparatus of claim 18 wherein the processor is further adapted to classify the first surface as a failing surface if the difference between the measured exerted force value and the nominal force value is greater than a predetermined threshold amount, and to classify the first surface as a passing surface if the difference between the measured exerted force value and the nominal force value is less than or equal to the predetermined threshold amount.

26.(New) The apparatus of claim 18 wherein:

the force gauge is adapted to move the first surface closer to the second surface, and to measure a last exerted force value prior to the first and second surfaces contacting each other; and

the processor further adapted to compare the last exerted force value measured prior to the first and second

surfaces contacting each other to a nominal force value that would be expected to be exerted between the first and second surfaces as a result of the Casimir force if the shape of the first surface were equivalent to the nominal shape.

27.(New) The apparatus of claim 18 wherein the first surface resides on a first side of a first object and the second surface resides on a first side of a second object, and wherein the force gauge comprises a piezoelectric transducer affixed to one of a second side of the first object and a second side of the second object.

28.(New) The apparatus of claim 18 wherein the first surface is a test surface of a rotating disc, and wherein the force gauge is adapted to perform a plurality of force measurements between the test surface and the second surface to obtain a plurality of measured exerted force values, and wherein the processor is adapted to determine defects in the test surface by comparing each one of the plurality of the measured exerted force values with a different one of the plurality of measured exerted force values.
